

CLIMATOLOGY OF THE UNITED STATES.

PREPARED by Prof. A. J. Henry, under the direction of Prof. Willis L. Moore, chief of the United States Weather Bureau, a volume¹ of 1012 pages has recently been published dealing with the climate of the United States. This most valuable contribution to meteorological science will be welcomed by all who wish for the advancement of this subject, and the Department of Agriculture is to be congratulated on publishing in this form the climatic statistics for the different portions of the United States.

Americans are nothing if not practical, and the issue of the volume before us is an excellent example of this. Thus, in the introduction, we are told first that the "need of such a volume has been felt for some time, particularly within the Department." Further, and this is where Great Britain might take a hint with regard to furthering the agricultural needs of her colonies, "During the last few years the Bureau of Plant Industry has introduced a number of seeds and plants new to this country, as well as new varieties of plants and grains already well established. In order that the best results may be obtained, it is essential that the new plant or seed be placed in a climate closely resembling that of its original habitat. The Pomologist has likewise felt the need of more generalised climatic data than is afforded by the scattered publications of the Weather Service, and this is true in other lines of research that are being prosecuted by the Department."

The above quotation is another instance, if one is required, that the American Government carefully fosters the study of meteorology, and thereby increases its revenue.

The data on which the statistics here given are based may be said to be taken from three sets of observations. Thus the first is due to the Medical Department of the Army, the observations being made at military posts during the period 1820-1890. The second is the result of observations made by the cooperating observers of the Smithsonian Institution, and extends from 1849-1874. The third and last set is due to the Signal Service and the Weather Bureau, and commenced in 1870 and is continued up to date.

In spite, however, of the fact that several records cover a great number of years, only a few records exceeding fifteen years in length are inserted in this volume. The reason for this, as stated, is that it is only within the last ten or twelve years that uniformity, both in observing and recording climatological data, has been attained.

The book before us may be considered as divided into three sections. The first portion consists of an admirable summary of the main features of the United States climate (pp. 7-84), supplemented with numerous maps and charts. The second part (pp. 85-118) consists of general tables of temperature, humidity, and wind, followed by a list and map of the climatological stations which appear in the report. The remaining but greater portion of the volume (pp. 119-1012) is composed of the contributions of the district forecaster or section director of each State. This, as a rule, takes the form of a general description in words of the climate of the State as a whole, then a State summary in tabular form regarding temperature, frost, and precipitation, and, lastly, the monthly, seasonal, and annual means for temperature and precipitation for each station, together with such data as description of locality, instrumental equipment, and positions of instruments. When it be

mentioned that no less than 690 stations are referred to, and the data for each station occupy a page, some idea of the amount of material dealt with can be obtained.

Reference has been made above to Prof. Henry's admirable summary of the broader features of American climate. This portion of the work should be read with great interest, because it brings together in clear and concise language an account of the general conditions of atmospheric circulation which occur over this large stretch of country. Justice to this essay could only be done by occupying considerable space, so remarks will be limited simply to one or two points which seem to be of more special interest. The first of these describes the conditions which accompany "cold waves," which occasionally pass over the country and envelop it in Arctic weather. The fall of temperature to justify one of these waves must, as is stated, be at least 20° F. in twenty-four hours, except along the Gulf Coast, where a drop of 16° F. or more constitutes a cold wave. Cold waves follow in the wake of cyclones under the influence of which the temperature has risen. The lowest isotherms are nearly coincident with the highest reading isobars in the anticyclonic system which follows the cyclone. The isotherms, other than the lowest, only very generally follow the trend of the isobars, and spread much further south over the United States than the isobars would suggest. The cause of these cold waves is due, not merely to the prevalence of the cold north-west winds which follow the passage of the low-pressure area, but more particularly to the radiation from the ground in the clear dry air in the rear of the cyclone. The cold of radiation is communicated to a greater stratum of air, and the effect of solar radiation is reduced, since the surface layers are being constantly renewed by colder air from higher latitudes. With little horizontal air movement in the anticyclone, the night temperatures are low, and there is a tendency for this cold air to collect in valleys and basins. January, February, and March are the months in which the waves chiefly occur, and in the eastern part of the United States the average number a year is three or four.

Prof. Henry gives some very instructive maps illustrating the barometric and thermometric conditions during some of the more intense waves that have been recorded.

Hot waves, or "heated terms" as he calls them, are more briefly dealt with, and some idea of their effect on humanity may be gathered from the statement that "during the three weeks that ended August 22, 1896, there were 2036 known deaths in the United States directly attributable to sunstroke. Large as this number is, it doubtless falls far short of the actual number of cases."

In the same thorough way in which the above waves of heat and cold have been discussed, Prof. Henry deals with precipitation, sunshine, wind (including thunderstorms and tornadoes), &c. The concluding section is devoted to seasonal variations from year to year. It will be remembered that at the beginning of the present year, when Europe was enveloped in a cold wave, Iceland, with a much more northern latitude, was revelling in warm weather. Similar inversions occur in the United States. Thus we read that, during the severe weather of March, 1906, when temperatures 10° F. to 20° F. below zero prevailed in the northern Rocky Mountain region, including the southern portions of Alberta, Assiniboia, and Winnipeg, the weather in Alaska, far away to the north, was warm and pleasant, with temperatures above freezing in the

¹ "Climatology of the United States." By A. J. Henry. U.S. Department of Agriculture. Weather Bureau, Bulletin Q. (Washington, 1906.)

lower Yukon Valley, and about freezing in the vicinity of Eagle (longitude 141° W.).

The primary object of the present work was to present in a form for easy reference comparative statistics for the different parts of the United States. This object has been very successfully attained in this volume so far as existing homogeneous observations allow, but the data for many stations will have to be revised when means can be formed for a greater number of years. Nevertheless, the volume is a valuable contribution to the meteorology of the portion of the world with which it deals, and will serve probably to stimulate the directors of some other meteorological services to bring together masses of existing material which are for the most part lying dormant.

DEDICATION OF THE CARNEGIE INSTITUTE.

THE trustees of the Carnegie Institute had permitted their European guests to select the steamers that suited them, and had taken quarters for them in the new and luxurious Hotel Belmont, 42nd Street, New York. On Wednesday morning, April 10, two special omnibuses and a luncheon car were provided to take the party to Pittsburgh, and one or two of the trustees were on board to welcome the guests and to make them known to one another. Amongst the party were Baron d'Estournelles de Constant and M. Paul Doumer, representing the Institut and various French universities; M. Leonce Benedite, director of the Luxembourg; and M. Camille Enlart, director of the Trocadéro Museum, Paris; their Excellencies T. von Moeller, Minister of State, and Lieut.-General von Loewenfeld, Adjutant-General, represented the German Emperor; Privy Councillor Dr. Koser, chief director of the Prussian State Archives and member of the Academy of Sciences, and F. S. Archenhold, director of the Treptow Observatory, represented scientific Germany; Sir Robert Ball, F.R.S., and Dr. Roberts, the Vice-Chancellor, represented the University of Cambridge; Dr. John Rhys represented Oxford University; whilst there were also present Sir Edward Elgar, Sir William Preece, F.R.S., and Dr. Chalmers Mitchell, F.R.S.

Continued snowstorms made it impossible to see much of the wild scenery of the Alleghenies, and the famous horse-shoe curve of the Pennsylvania Railroad was traversed in a regular blizzard. The party reached Pittsburg about 8 p.m., and at the Hotel Schenley, situated in the Schenley Park, a few yards from the Carnegie Institute, found assembled a very large number of Americans representing nearly all the scientific institutions and universities of the United States and from Canada, Principal Peterson and Dr. Bovey from the McGill University, Montreal, and Dr. Galbraith from Toronto.

The proceedings began on Thursday morning, April 11, with a reception of the guests in the founder's room by Mr. Frew, president of the board of trustees, who above all others has been responsible for the translation of Mr. Carnegie's generosity into the actual buildings. This was followed by a reception in the grand foyer of the institute, at which the guests were presented to Mr. and Mrs. Carnegie. After luncheon there was a procession of the guests in uniform or academic costume through lines of cheering students, from the hotel to the institute. At 2 o'clock nominally, actually about 3.30 p.m., the dedication took place. The Cambridge Vice-Chancellor delivered an "invocation," modelled on the university "bidding prayer"; Principal Rhys read a

scripture lesson (Proverbs, iii., 9-27), Mr. Carnegie delivered a long address, and M. d'Estournelles de Constant and Theodor von Moeller presented official congratulations from France and Germany.

It was notable, and somewhat humiliating to the English visitors, how elaborately Germany had made official arrangements for showing the sympathy of its Government. At each function Germany was to the fore; there was a personal cable from the Emperor, the Emperor's high representatives appeared with their staff in brilliant uniform, and a special gift of German State records and Blue-books, and the formal return gift from Mr. Carnegie of a cast of *Diplodocus*, were only characteristic examples of the German activity. The high position and exquisite tact of Baron d'Estournelles de Constant, together with the public announcement made by him a few days later at New York, that the French Government had commissioned him to bestow the Grand Cross of the Legion of Honour on Mr. Carnegie, supported the prestige of France, but although the British subjects who were present ably upheld the position of England in their individual capacities, there was no one formally commissioned to represent the English Government.

On Friday, April 12, there was an informal reception at the technical institute, and a presentation of addresses in the large hall from the various universities and learned bodies throughout the world. There were in addition a number of addresses delivered in whole or in part by the European guests; Sir Robert Ball took as his subject "The Solution of a Great Scientific Difficulty," stating the difficulty in the old supposition that the contraction of its sphere could be the source of the energy radiated out by the sun, and suggesting that the presence of radium offered a solution. Sir W. H. Preece spoke on the connection between science and engineering, tracing the extent to which the art of the engineer had been indebted to the researches of pure science. Dr. Chalmers Mitchell discussed international co-operation in zoology, dealing specially with the necessity for unity in nomenclature and with progress in the international recording of zoological literature. In the evening there was a large banquet, and the proceedings ended on Saturday morning with the ceremony of the conferring of honorary degrees by the Western University of Pennsylvania. The English recipients were as follows:—LL.D., Sir Robert Ball, Sir Robert Cranston, Sir Edward Elgar, Dr. P. Chalmers Mitchell, Sir W. H. Preece, Dr. John Rhys, the Rev. Dr. E. S. Roberts, Dr. John Ross; Litt.D., Mr. C. Moberly Bell and Mr. W. T. Stead.

The Carnegie Institute, the area of which is nearly four acres, and the adjacent technical schools, which when completed will cover with their workshops and yards nearly thirty-two acres, are the "gifts of Andrew Carnegie to the people of Pittsburg," and are dedicated to "literature, science, and art." The total cost, together with a recent endowment for maintenance of more than a million pounds, has been about four million pounds. The management is vested in a board of trustees consisting of local representative men, under whom Dr. W. J. Holland is director of the museum, Mr. John W. Beatty director of the fine arts department, Mr. A. A. Hamerschlag director of the technical schools, whilst Mr. A. H. Hopkins is chief librarian. The exterior of the institute proper is unpretentious, the structure being of steel faced with grey sandstone in a simplified Corinthian style. The interior is a series of gorgeous halls and corridors in marble and gilding, decorated with a striking series of mural paintings by Mr. J. W. Alexander, a